

LISTING OF CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Claim 1 (Canceled).

2. (Previously Presented) A method according to claim 21 wherein said valid end time is provided by either:

(i) storing said valid end time entered in said database associated with said value for said attribute; or

(ii) determining said valid end time from a valid start time of another value of said attribute stored in said database.

Claims 3-5 (Canceled).

6. (Previously Presented) A method according to claim 21 comprising providing said values for data entries in a relational database.

7. (Previously Presented) A method of obtaining information from a database comprising updating entities in said database with time dependent values for attributes in accordance with claim 21 and querying said database for a value for selected data entity(s).

8. (Currently Amended) A method according to claim 7 comprising having a Temporal Data Dictionary having a set of objects associating specific entities in said database with specific functionality-related parameters which are used in controlling how a processor handles a query relating to said entities, said Temporal Data Dictionary maintaining data integrity.

9. (Original) A method according to claim 8 comprising having a relational database, and wherein the Temporal Data Dictionary also maintains referential integrity rules for data entities that are referentially related, and wherein referential integrity for data entries during a response to queries of the database is maintained by the temporal data dictionary, rather than by specific application--level routines running on a database server processor.

10. (Currently Amended) A method according to claim 21 wherein data relating to each attribute ~~specific data entity~~ is held in corresponding data-entity associated Time Cubes that comprise valid and transaction time related values for different attributes in different attribute-slices of said Time Cube.

11. (Original) A method according to claim 10 wherein for each Time Cube there is a single primary key attribute having associated values over transaction and valid time, and wherein in the Time Cubes there is another, or a plurality of other foreign key attributes having a value, or values, which are valid and/or transaction time dependent.

12. (Currently Amended) A computer-implemented database having a model of entities on said database in which each entity has an associated Time Cube:

i) said Time Cubes comprising at least one attribute having allowable values in X-Time and an associated Y-time, X-time being the whole system time from start of system time to end of system time within which valid time will exist for said entity, and Y-Time being system-generated time representative of transaction time at which specific allowable values are true, and

wherein there are start times in X-time for attributes and end times in X-times for attributes, there being a plurality of start and end times simultaneously stored in the database for at least one value of at least one attribute,

the plurality of start and end times for said attribute being associated with respective different Y-times, and

wherein said model allows insert only events, with update and delete functions being achievable by insert events that do not alter existing start times and end times stored in the database.

Claims 13-14 (Canceled).

15. (Currently Amended) A computer-implemented method of holding data in a database comprising using a data model to hold data concurrently and consistently represented over time, the method comprising

including time as a characteristic associated with values of attributes of entities on said database, and

achieving update and delete of start time and end time of values of attributes of entities by using inserts, adding to the database, to achieve logical update and logical delete, without any requirement for actual code-level update and actual code-level delete operations, and wherein all logical delete update and insert operations are achieved by physical insert operations inserting new values of attributes and inserting new start times and/or end times associated with the new values without altering existing start times or end times stored in the database.

16. (Currently Amended) A computer-implemented method of modifying the value of an entity in a database comprising for each entity having one or more attributes, each attribute having one or more value over valid time, and storing for each value a start time of valid time from which the value applies, an end time of valid time to which the value applies, and a transaction time at which said start and end times in valid time apply, the method comprising

achieving logical update and delete operations on said start and end times stored in the database by inserting new entries in the database without altering existing entries in the database, the new entries being associated with a different transaction time.

17. (Currently Amended) A computer-implemented method of modifying the value of an entry in a database comprising for the entry having one or more attributes, each attribute having one or more values over valid time, the method comprising-and

storing for each value a start of valid time from which the value applies, and a transaction time at which the start of valid time applies, and

performing logical update or delete of the start of valid time by performing an insert operation to insert a new entry into the database having a modified start of valid time,

the existing entry ~~of the start of valid time~~ remaining unchanged.

18. (Currently Amended) A computer-implemented method of modeling ~~modelling~~ changes in values of attributes in time in a database, the method comprising

for each attribute of an entity in the database storing ~~having~~ summary positions associated with corresponding transaction times, each summary position, specific to a transaction time, having for each attribute a value, a start time ~~in valid time~~ at which said value applies, and optionally an end time ~~in valid time~~ at which said value applies; and wherein said transaction time represents a time at which associated values, and start times, and optionally end times for those values, are taken to be true; and

generating ~~wherein~~ an additional summary position ~~is generated~~ whenever an insert, logical update, or logical operation is performed on the database, and wherein logical delete and logical update are performed by inserting a new summary position with appropriate transaction time and start and optionally end ~~valid~~ times for an associated value for an attribute and without altering existing summary positions stored in the database.

Claim 19 (Canceled).

20. (Currently Amended) A computer-implemented ~~In a temporal database system having a temporal database storing a database table comprising a plurality of data rows, said rows relating to attributes of a database entity and storing values for said attributes organised into particular respective database fields, an improved method for granting access during the modification of the information in a database~~ field included in a temporal database fields, the method comprising

locking the field being accessed for modification and not locking other fields in a the row that contains the field being accessed for modification, this being achieved by associating a transaction time with ~~the~~ information in each field, said transaction time being related to a the system time at which the information was inserted into the database,

permitting insert only operations on the database, with alter and/or delete functionality performed by insert-only addition of another value of an attribute held in a certain field in an additional field differentiated from other fields for the same attribute by its associated transaction time, and

selecting an appropriate field for access by selecting an appropriate transaction time, as well as selecting said attribute to be queried or modified, logical update or delete operations being achieved by an insert of a new database entry having a different transaction time, the previous entries remaining unchanged.

21. (Currently Amended) A computer-implemented method of updating and deleting values of attributes in a database, the database having stored in it a summary position in which attributes have associated with them a valid start time from which the value of the attribute will hold true and a valid end time up to which the value of the attribute will hold true, and a transaction time associated with the summary position at which transaction time the valid start time and valid end time of the value of the attribute are true, the method comprising

performing updating and deleting logical operations on the values of attributes by inserting into the database a new insert summary position with a new particular transaction time without altering any existing summary position, logical update and delete of valid start time and valid end time for a value of an attribute being achieved by inserting the new summary position with a different valid start time or valid end time that is to be true for the new particular transaction time.

22. (New) A computer-implemented method of modifying data stored in a database, the database having a first summary position in which an attribute has a start time indicating a time from which a value of the attribute will hold true, an end time indicating time up to which the value of the attribute will hold true, and an associated transaction time indicating a time at which the start time and the end time of the value of the attribute will hold true, the method comprising:

performing updating and deleting logical operations on the value of the attribute by inserting into the database a second summary position including a new transaction time without altering the first summary position.